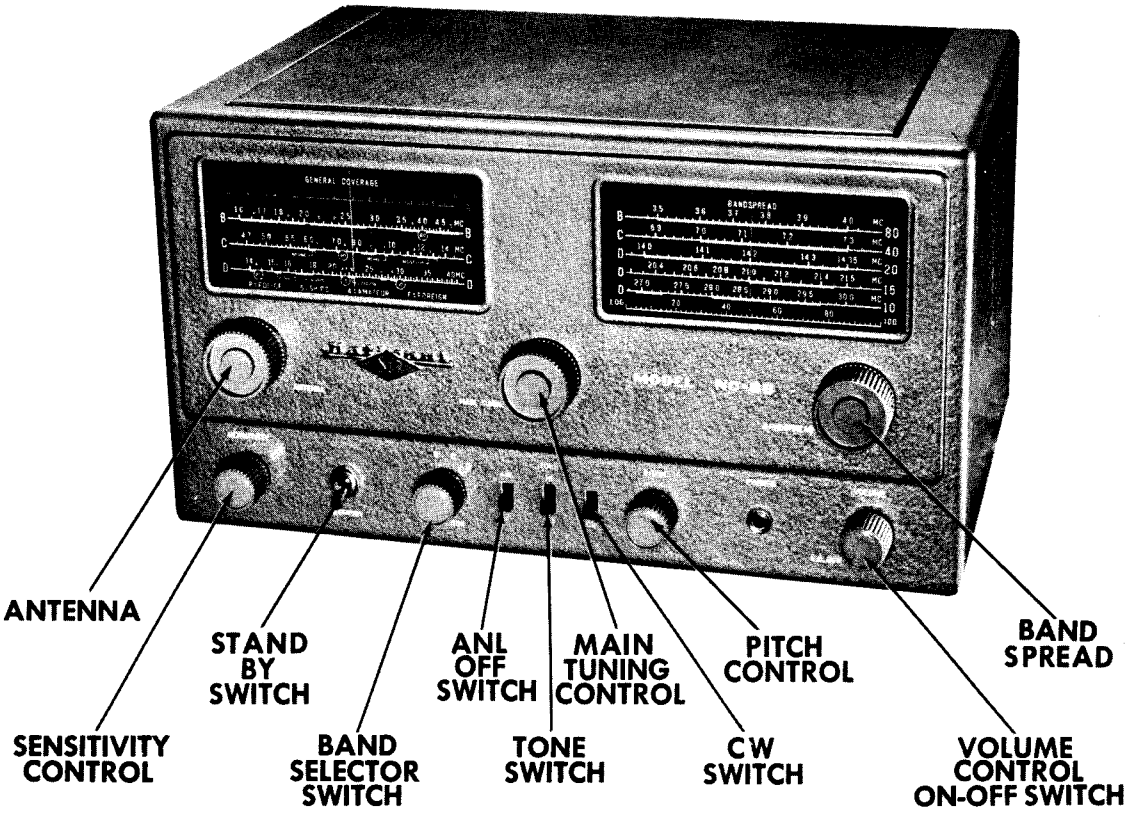
NATIONAL
MODEL NC-88



NATIONAL
MODEL NC-88

TRADE NAME	National Model NC-88	
MANUFACTURER	National Co., Inc., 61 Sherman St., Malden 48, Mass.	
TYPE SET	AC Operated 4-Band Superheterodyne Communications Receiver	
TUBES (Nine)	Types 6BA6 RF Amp., 6C4 Osc., 6BE6 Mixer, (2) 6BD6 IF Amp., 6AL5 Det.-AVC-Noise Limiter, 12AX7 CW Osc.-AF Amp., 6AQ5 Audio Output, 5Y3GT Rectifier	
POWER SUPPLY	105/130 Volts AC-50/60 Cycles	RATING .56 Amp. @ 117 Volts Ac
TUNING RANGE	Band "A"—540-1600KC Band "B"—1.6-4.7MC	Band "C"—4.7-14.0MC Band "D"—14.0-40MC

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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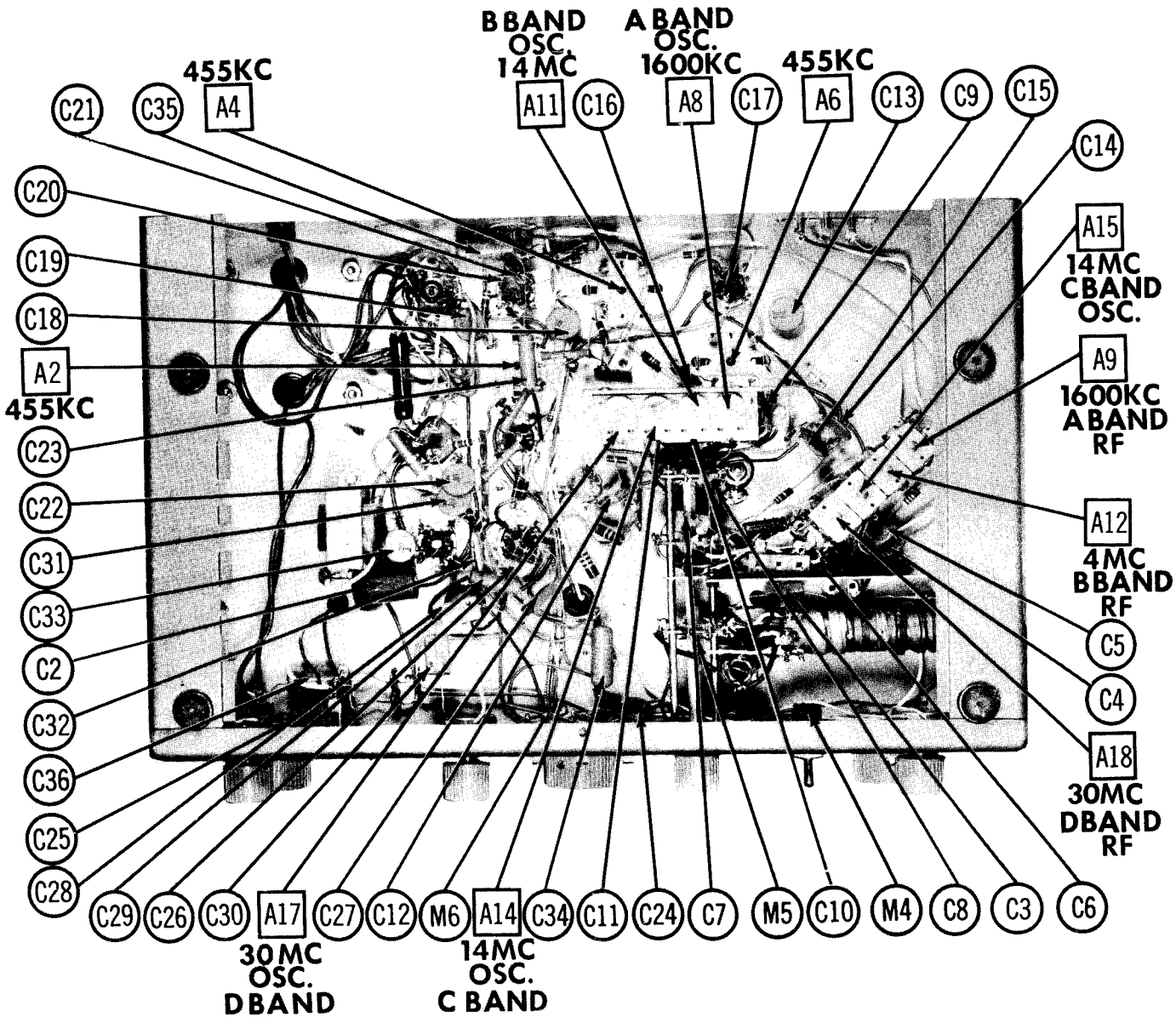
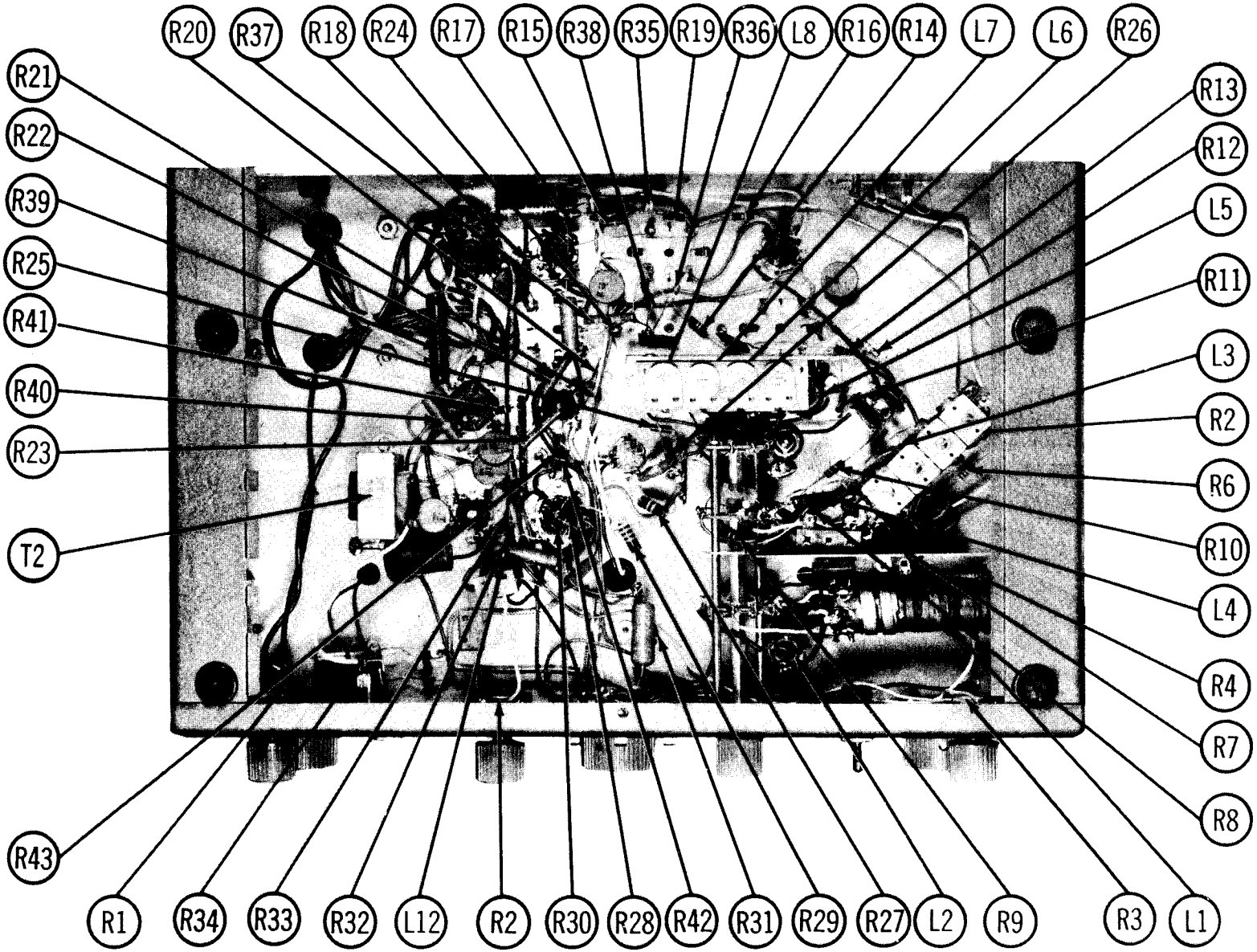


CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

MODEL NC-88

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Remove external antenna and turn sensitivity control fully counter clockwise.
Set the " receive-standby" switch to "receive" position.
Set ANL-off switch to "off" position.
Set AM-CW switch to "AM" position.
Place the band spread pointer on the "set" mark (near 86 on the log scale).
Turn on receiver and test equipment. Allow 15 minute warm up period.

IF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.01MFD	High side to lug on stator plates of center section of center section of main tuning gang. Low side to chassis.	455KC (400∿Mod)	"A"	Tuning gang fully open	Across voice coil	A1, A2, A3, A4, A5, A6	Adjust for maximum deflection.
2.	Check alignment of BFO oscillator by placing AM-CW switch to CW position. With pitch control tune BFO for zero beat with signal generator. Zero beat should occur when red dot on pitch control is at the top dead center position. If necessary, set pitch control to place red dot, at the top center position. Adjust A7 for zero beat. Return AM-CW switch to "AM " position.							

RF ALIGNMENT

Incorrect mechanical calibration is indicated when the frequency readings are off a certain equal linear amount on all bands. With the main tuning gang fully closed place the pointer at the first marker on the "C" scale (just to left) of 4. 7MC marker.) With the band spread tuning gang fully closed set pointer to the zero marker on the log scale.
The oscillator operates on the high side on the "A", "B" and "C" bands and on the low side on the "D" band .

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
3.	300Ω Carbon Resistor	High side thru 300Ω to left hand antenna terminal. Low side to chassis (connect link from terminal "G" to middle terminal).	1600KC	"A"	1600KC	Across voice coil	A8, A9	Adjust for maximum deflection.
4.	"	"	600KC	"	600KC	"	A10	Adjust for maximum deflection. Repeat steps 3 and 4.
5.	"	"	4.0MC	"B"	4.0MC	"	A11, A12	Adjust for maximum deflection.
6.	"	"	1.6MC	"	1.6MC	"	A13	Adjust for maximum deflection. Repeat steps 5 and 6.
7.	"	"	14.0MC	"C"	14.0MC	"	A14, A15	Adjust for maximum deflection. If A14 has two peaks use the peak closest to minimum capacity. If A15 has two peaks use the peak closest to maximum capacity.
8.	"	"	5.0MC	"	5.0MC	"	A16	Adjust for maximum deflection. Repeat steps 7 and 8.
9.	"	"	30.0MC	"D"	30.0MC	"	A17, A18	Adjust for maximum deflection. If A17 has two peaks use the peak closest to maximum capacity. If A18 has two peaks use the peak closest to minimum capacity.
10.	"	"	15.0MC	"	15.0MC	"	A19	Turn A19 counter clockwise as far as possible then turn clockwise until second peak is obtained. Adjust for maximum deflection on second peak. Repeat steps 9 and 10.

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		NATIONAL PART No.	STANDARD REPLACEMENT		
V1	RF Amplifier	6BA6	6BA6	7BK	
V2	Oscillator	6C4	6C4	6BG	
V3	Mixer	6BE6	6BE6	7CH	
V4	1st IF Amp.	6BD6	6BD6	7BK	
V5	2nd IF Amp.	6BD6	6BD6	7BK	
V6	Det-AVC-Noise Limiter	6AL5	6AL5	6BT	
V7	CW Oscillator-AF Amplifier	12AX7	12AX7	9A	
V8	Audio Output	6AQ5	6AQ5	7BZ	
V9	Rectifier	5Y3GT	5Y3GT	5T	

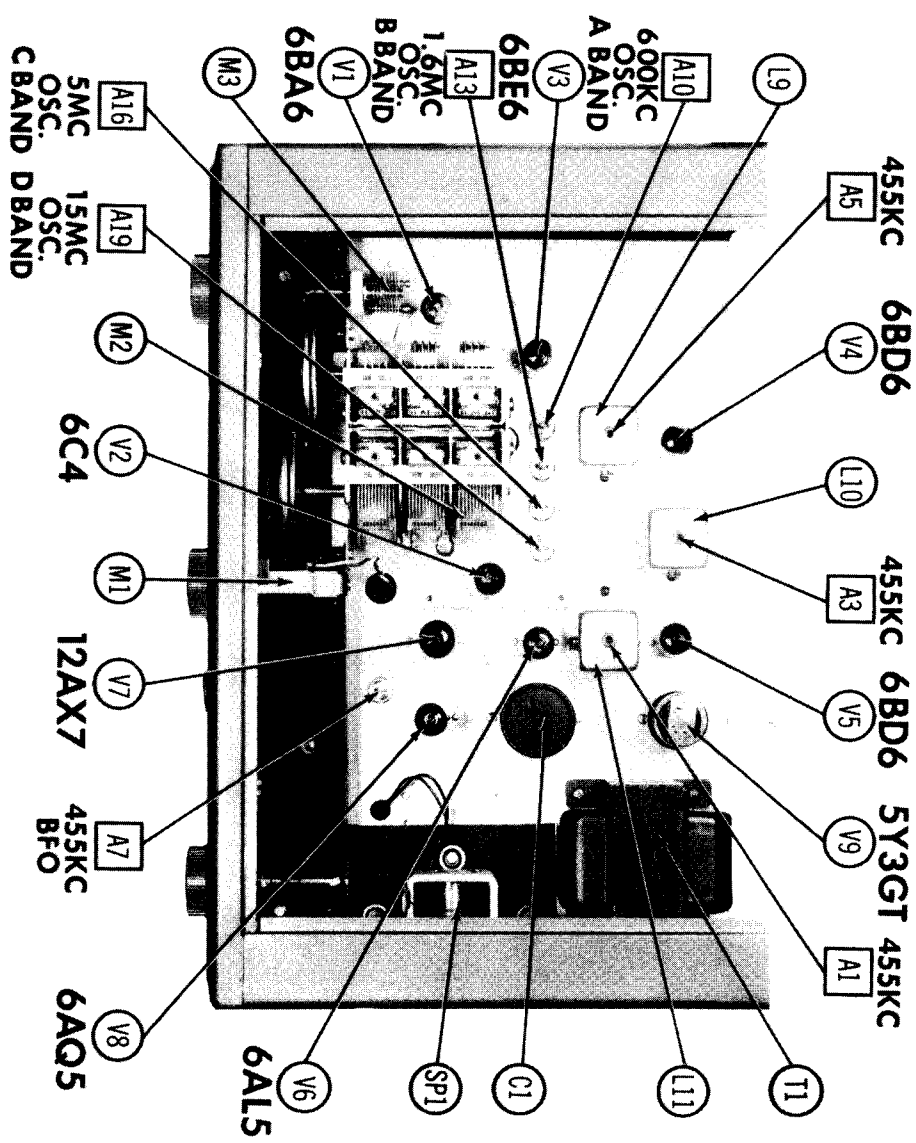
CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	NATIONAL PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	▲20	450	H325-2	AFH3-36		CO27		FP376.5	TVL-3780	
B	■20	450								
C	▲20	450								
C2	25	50	E338-4	PRS50/25		BR255		TC36	TVA-1306	
C3	220	500	J665-44	1479-00025		5R5T25		MCB240		
C4	10000		K946-2	BPD-01	DD-103	TM5S1	811-01	DC-511	5HK-S1	
C5	10000		K946-2	BPD-01	DD-103	TM5S1	811-01	DC-511	5HK-S1	
C6	10000		K946-2	BPD-01	DD-103	TM5S1	811-01	DC-511	5HK-S1	
C7	510	500	J665-57							
C8	220	500	J665-44	1479-00025		5R5T25		MCB240		
C9	470	500	J665-55							
C10	1000	500	J665-70	1464-001		1R5D1		MCE251	MS-21	
C11	3000	500	J666-30	1464-003		1R5D3		MCE461	MS-23	
C12	1000	500	J665-71	1464-001		1R5D1		MCE251	MS-31	
C13	10000		K946-2	BPD-01	DD-103	TM5S1	811-01	DC-511	5HK-S1	
C14	10000		K946-2	BPD-01	DD-103	TM5S1	811-01	DC-511	5HK-S1	
C15	10000		K946-2	BPD-01	DD-103	TM5S1	811-01	DC-511	5HK-S1	
C16	10000		K946-2	BPD-01	DD-103	TM5S1	811-01	DC-511	5HK-S1	
C17	10000		K946-2	BPD-01	DD-103	TM5S1	811-01	DC-511	5HK-S1	
C18	10000		K946-2	BPD-01	DD-103	TM5S1	811-01	DC-511	5HK-S1	
C19	10000		K946-2	BPD-01	DD-103	TM5S1	811-01	DC-511	5HK-S1	
C20	10000		K946-2	BPD-01	DD-103	TM5S1	811-01	DC-511	5HK-S1	
C21	10000		K946-2	BPD-01	DD-103	TM5S1	811-01	DC-511	5HK-S1	
C22	10000		K946-2	BPD-01	DD-103	TM5S1	811-01	DC-511	5HK-S1	
C23	.01	400	Q963-19	P488-01	D6-103	PTE4S1	GP2-333-103	PT411	4TM-S1	
C24	10000		K946-2	BPD-01	DD-103	TM5S1	811-01	DC-511	5HK-S1	
C25	.01	400	Q693-19	P488-01	D6-103	PTE4S1	GP2-333-103	PT411	4TM-S1	
C26	47		D825D-447	SI27	D6-270		GP1K-270	UC-5427	5GA-Q27	
C27	270		J665-47	1479-00025		5R5T25		MCB240		
C28	220	500	J665-44	1479-00025		5R5T25		MCB240		
C29	.01	400	Q693-19	P488-01	D6-103	PTE4S1	GP2-333-103	PT411	4TM-S1	
C30	270	500	J665-47	1479-00025		5R5T25		MCB240		
C31	10000		K946-2	BPD-01	DD-103	TM5S1	811-01	DC-511	5HK-S1	
C32A	.005		*R983-1	*PA-112-2	*PC-71		*1406-02		*104C5	
B	250									
C										
C33	10000		K946-2	BPD-01	DD-103	TM5S1	811-01	DC-511	5HK-S1	
C34	.047	400	Q693-28	P488-047	DF-503	PTE4S47		PT4147	4TM-S47	
C35	.1	400	Q693-34	P488-1		PTE4P1		PT401	4TM-P1	
C36	.047	400	Q693-28	P488-047		PTE4S47		PT4147	4TM-S47	

* Items C32A, C32B, C32C and R32A, R32B are combined in one unit.
When replacing items separately C32B and C32C should total 250MMF.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	NATIONAL PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	500KΩ	½	K347-1	Q13-133	AG-60-Z	B-60-S	U-48	Volume
B	Shaft		Not Req.	Not Req.	RS-2	Not Req.	Not,Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWB	Not Req.	US-26	Attach to R1A
R2A	1500Ω	½	K915-16	Q11-110	AG-11-S	B-6	U-6	Pitch
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R2A
R3A	10KΩ	2	K349-3		A43-10K		R10,000L	Sensitivity (Wire wound)
B	Shaft		Not Req.		FS-3		DS36	Attach to R3A

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	NATIONAL PART No.	IRC PART No.	
R4	470KΩ	½	J569-57	BTS-470K	
R5	68Ω	½	J569-11	BTS-68	
R6	47KΩ	½	J569-45	BTS-47K	
R7	68Ω	½	J569-11	BTS-68	
R8	2200Ω	½	J569-29	BTS-2200	
R9	15KΩ	1	J571-39	BTA-15K	
R10	33Ω	½	J569-7	BTS-33	
R11	220Ω	½	J569-17	BTS-220	
R12	150KΩ	½	J569-51	BTS-150K	
R13	220Ω	½	J569-17	BTS-220	
R14	270KΩ	½	J569-54	BTS-270K	
R15	2200Ω	½	J569-29	BTS-2200	
R16	100KΩ	½	J569-49	BTS-100K	
R17	680Ω	½	J569-23	BTS-680	
R18	100KΩ	½	J569-49	BTS-100K	
R19	2200Ω	½	J569-29	BTS-2200	
R20	270KΩ	½	J569-54	BTS-270K	
R21	270KΩ	½	J569-54	BTS-270K	
R22	1Meg	½	J569-61	BTS-1Meg	
R23	1Meg	½	J569-61	BTS-1 Meg	
R24	2. 2Meg	½	J569-65	BTS-2. 2Meg	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	NATIONAL PART No.	IRC PART No.	
R25	150Ω	½	J569-15	BTS-150	
R26	47KΩ	½	J569-45	BTS-47K	
R27	15KΩ	1	J571-39	BTA-15K	
R28	100KΩ	½	J569-49	BTS-100K	
R29	47KΩ	1	J571-45	BTA-47K	
R30	10Meg	½	J569-73	BTS-10Meg	
R31	470KΩ	½	H569-57	BTS-470K	
R32A	250KΩ	½	* R983-1		
B	500KΩ	½			
R33	270Ω	1	J571-18	BTA-270	
R34	22Ω	1	J571-5		
R35	100KΩ	1	J571-49	BTA-100K	
R36	150KΩ	½	J569-51	BTS-150K	
R37	6800Ω	½	J569-35	BTS-6800	
R38	2. 2Meg	½	J569-65	BTS-2. 2Meg	
R39	2000Ω	10	M707-2	1 3/4A-2000	
R40	4700Ω	2	J572-33	BTB-4700	
R41	4700Ω	½	J569-33	BTS-4700	
R42	10Ω	½	J569-1	BTS-10	
R43	10Ω	½	J569-1	BTS-10	

* Items R32A, R32B, C32A, C32B, C32C are combined in one unit.

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA				
	PRI.	SEC. 1	SEC. 2	SEC. 3	NATIONAL PART No.	STANCOR PART No.	MERIT PART No.	Halldorson PART No.	TRIAD PART No.
T1	117VAC ② , 56A	620VCT . 064ADC	5VAC ② 2A	6. 3VAC ② 2. 8A	K-316-2 K-316-5 ①	PC-8408 ② ③	P-3151 ② ③	P9304 ② ③	R-9A ② ③

① Alternate power trans.
② Drill new mounting holes.
③ Tape center tap on 6. 3V winding.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA					NOTES
	IMPEDANCE		DC RES.		NATIONAL PART No.	STANCOR PART No.	MERIT PART No.	Halldorson PART No.	TRIAD PART No.	
	PRI.	SEC.	PRI.	SEC.						
T2	4. 6KΩ	3. 1Ω	295Ω	. 56Ω	K313-3	A-3877	A-2930	Z1107	S-3X	① Drill one new mtg. hole.

PARTS LIST AND DESCRIPTIONS (Continued)

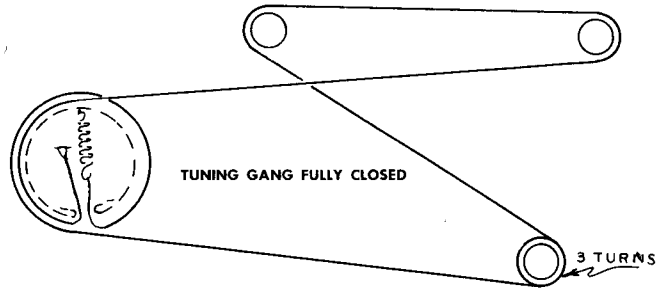
COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	NATIONAL PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1A	Ant. Coil	30Ω	2.8Ω					Band "A", 540-1600KC
B	Ant. Coil	.9Ω	.8Ω	SB:1517				Band "B", 1.6-4.7MC
C	Ant. Coil	.9Ω	0Ω					Band "C", 4.7-14MC
L2	Ant. Coil	.1Ω	0Ω	SB:1519				Band "D", 14-40MC
L3A	RF Coil	30Ω	2.8Ω					Band "A"
B	RF Coil	.9Ω	.8Ω	SB:1518				Band "B"
C	RF Coil	.9Ω	.1Ω					Band "C"
L4	RF Coil	0Ω		SB:1520				Band "D"
L5	Osc.Coil	1Ω	1.5Ω	SB:1573-1	14-1060	BC-381	71-Osc.	Band "A"
L6	Osc. Coil	.8Ω	1.2Ω	SB:1574-1				Band "B"
L7	Osc. Coil	.1Ω	.1Ω	SB:1575-1				Band "C"
L8	Osc. Coil	.1Ω	0Ω	SB:1576-1				Band "D"
L9	1st.IF Trans.	20Ω	20Ω	Q242-2	16-5740	BC-339	912-C2	
L10	2nd.IF Trans.	20Ω	20Ω	Q242-2	16-5742	BC-339	912-C2	
L11	3rd.IF Trans.	18Ω		Q242-1	16-6770 *	BC-376	312-C6	Includes 47KΩ resistor and diode load filters
L12	BFO Coil	6Ω		SA:5361				Tapped ② 4.8Ω

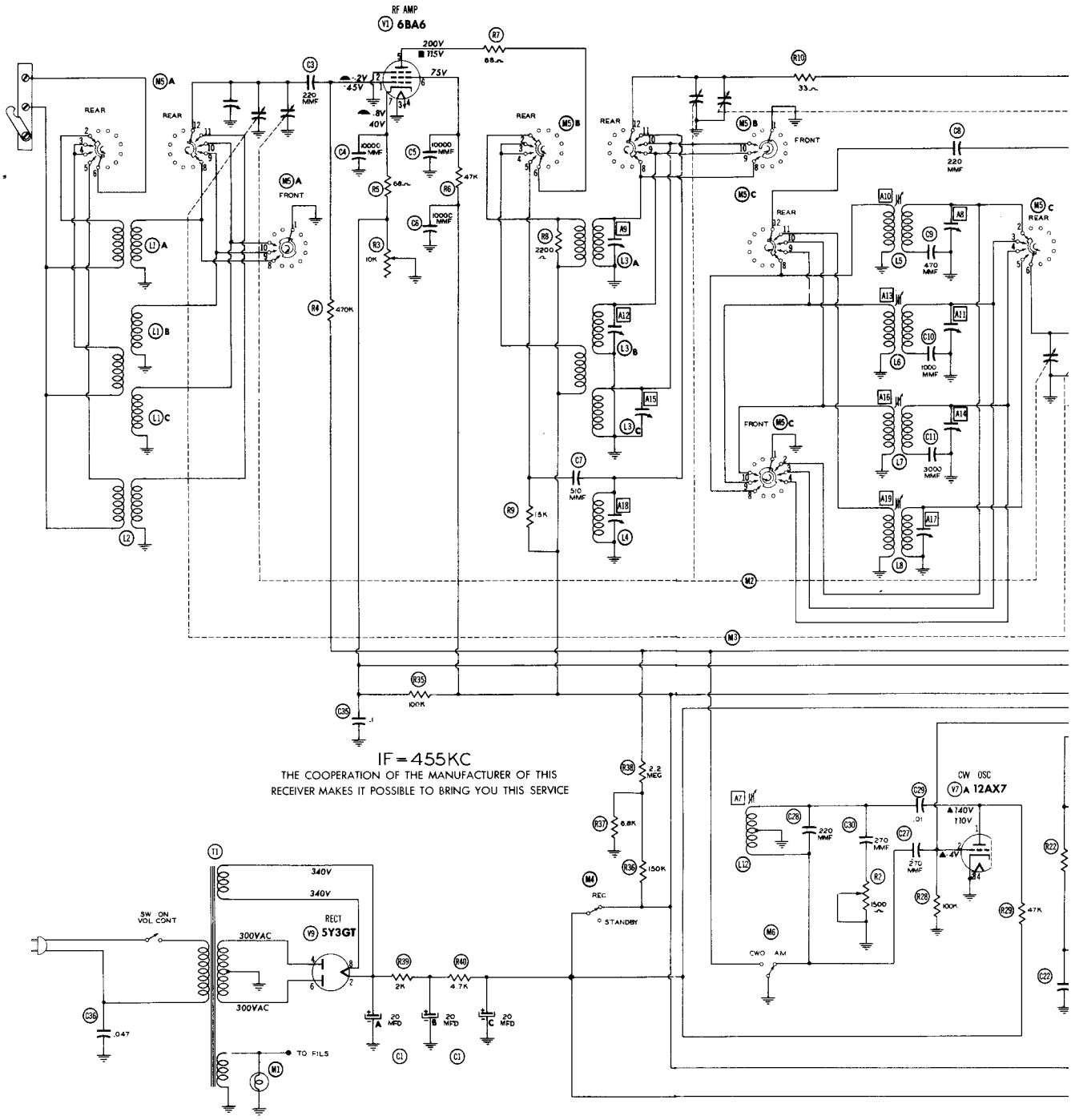
* Cut out chassis metal strip, use adaptor plate and add 47KΩ resistor externally.

MISCELLANEOUS

ITEM No.	PART NAME	NATIONAL PART No.	NOTES
M1	Dial light	F136-11	# 47 bayonet
M2	Tuner	P705-2	General coverage (3 sections at 13-454MMF each)
M3	Tuner	P706-2	Bandspread (3 sections at 10-37MMF each)
M4	Switch	E230-2	Stand by-receive (toggle-SPST)
M5	Switch	S245-1	Band selector
M6	Switch	L209-2	(3) ANL-off, tone HI-L), AM-CW (slide SPDT)
	Trimmer cap	S662-1	Antenna-air variable (5-50MMF)
	Trimmer cap	D832-5	RF-mica (4) used (2. 2-40MMF)
	Trimmer cap	E311-2	Osc-ceramic (2) used (5-20MMF)
	Trimmer cap	E311-1	Osc-ceramic (2) used (2. 5-6MMF)
	Knob	SA:5292-2	Large (3) used-antenna, main and band spread tuning
	Knob	SA:9305	Small (4) used-sensitivity, band select, pitch, volume



DRIVE CORD STRINGING



Item	Tube	Pin 1	Pin 2	
V 1	6BA6	1.8Meg	0Ω	
V 2	6C4	†22KΩ	INF	
V 3	6BE6	47KΩ	220Ω	
V 4	6BD6	1.6Meg	0Ω	
V 5	6BD6	1.3Meg	0Ω	
V 6	6AL5	0Ω	270KΩ	
V 7	12AX7	†50KΩ	100KΩ	
V 8	6AQ5	500KΩ	270Ω	
V 9	5Y3GT	INF	1Meg	

† MEASURED FROM PIN 2 OF
■ MEASURED WITH M5 ON "
▲ MEASURED IN "CW" POSIT
▲ SENSITIVITY AT MINIMUM
● SENSITIVITY AT MAXIMUM
VOLTAGE & RESISTANCE MEA

1. DC volts
AC volts
2. Socket c
3. Measure
4. Line v o
5. Nominal
variatio
6. Volume
measure

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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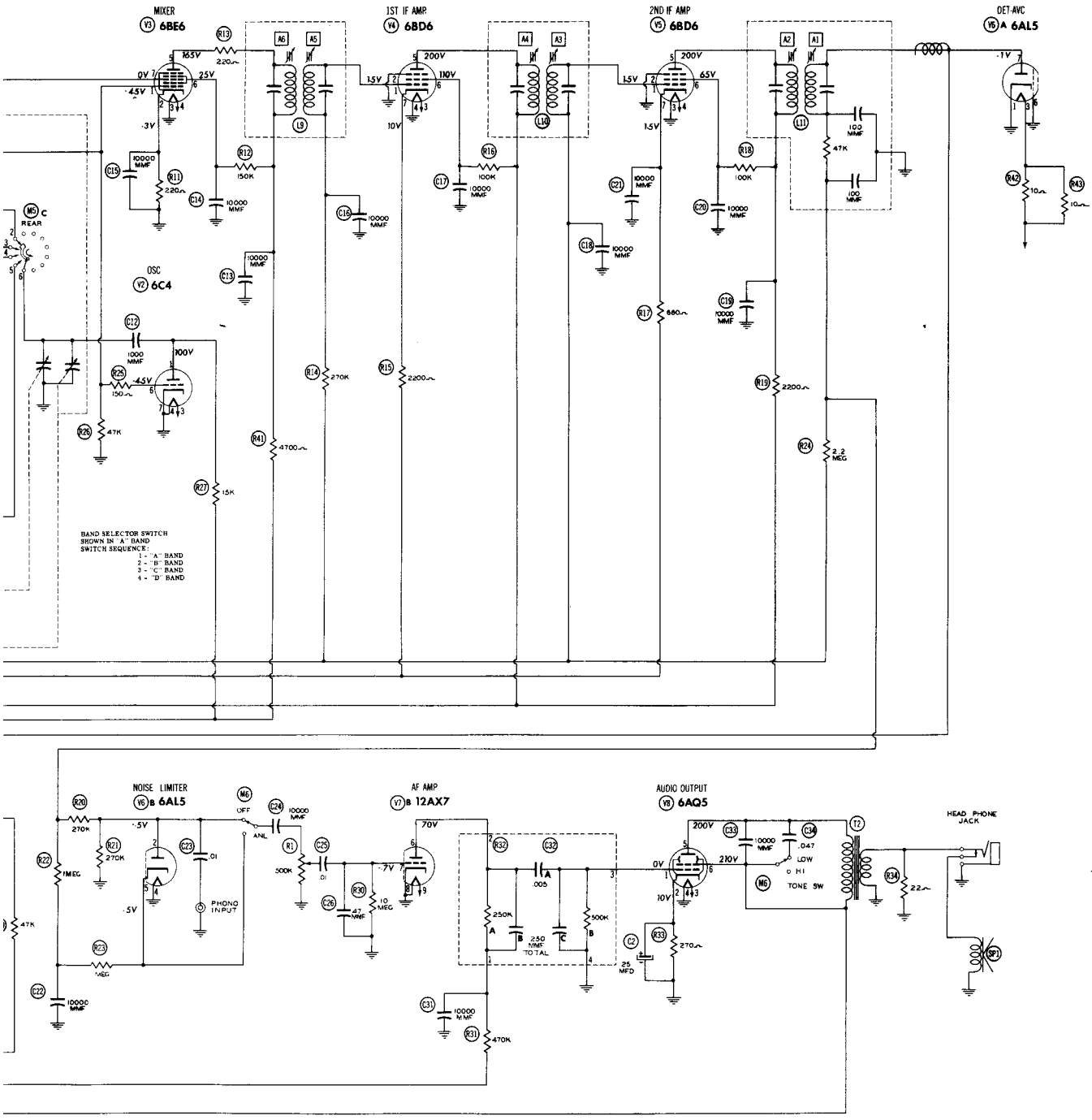

RESISTANCE READINGS

Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
0Ω	0Ω	.1Ω	▪17KΩ †2KΩ	†50KΩ	68Ω - 10KΩ		
INF	.1Ω	0Ω	†22KΩ	47KΩ	0Ω		
220Ω	0Ω	.1Ω	†12KΩ	†160KΩ	35Ω		
0Ω	.1Ω	0Ω	†2KΩ	†100KΩ	2.2Ω - 12KΩ		
0Ω	0Ω	.1Ω	†4.2KΩ	†105KΩ	680Ω - 10.5KΩ		
270KΩ	2Ω	0Ω	2.5Meg	0Ω	550KΩ		
100KΩ	0Ω	0Ω	0Ω	†720KΩ	10Meg	0Ω	.1Ω
270Ω	.1Ω	0Ω	†2.3KΩ	†2KΩ	500KΩ		
1Meg	INF	90Ω	0Ω	95Ω	.1Ω	1Meg	

OM PIN 2 OF V8
ITH M5 ON "D" BAND.
"CW" POSITION
AT MINIMUM (FULLY COUNTER CLOCKWISE)
AT MAXIMUM (FULLY CLOCKWISE)
ISTANCE MEASUREMENTS TAKEN ON BAND "A" UNLESS OTHERWISE NOTED.

1. DC voltage measurements taken with vacuum tube voltmeter, AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

233-7